

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### DRAWINGS ATTACHED

### Improvements in Hose End Fittings

WE, SUPERFLEXIT LIMITED, a British Company, of 118 Buckingham Avenue, Trading Estate, Slough, in the County of Buckingham, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to end fittings for hoses composed of materials having the property of cold flow such as for example polytetrafluoroethylene, nylon, polypropylene, hard polyvinylchloride or polythene, which end fittings have to withstand very high internal pressures, such hoses being protected by a surrounding metal braided or plaited tubular covering with or without a further outer covering of braided asbestos or other suitable material.

To withstand high internal pressures which tend to separate the hose and its outer covering or coverings from the end fitting it is very desirable that both the hose and the outer covering or coverings shall be gripped very firmly at their ends by the parts of the end fitting and the chief object of the invention is to evolve an improved form of end fitting having the desired characteristics.

An end fitting in accordance with the present invention includes a tubular nipple formed with internally arranged annular grooves and adapted to receive the end of the hose, a tubular metal liner of a diameter slightly greater than the internal diameter of the hose insertable into the end of the hose to expand the hose and force the material of the hose radially outwardly into the annular grooves in the nipple to secure the hose firmly to the end fitting and a tubular ferrule surrounding that part of the nipple entered by the end of the hose and enclosing the end of the metal braided

or plaited tubular hose covering, the latter being sandwiched and gripped between the nipple and ferrule, the ferrule being swaged into permanent engagement with an annular groove in the nipple or liner.

The tubular liner may take the form of a loose tubular component which fits the interior of that part of the nipple which does not enclose the end of the hose, the liner being secured by suitable means in position within the nipple or it may form a part of an elbow or other fitting to which the hose is to be attached.

According to a further feature of the invention the interior surface of the ferrule is formed with spaced annular grooves for the entry of the metal braided covering, the action of forcing the ferrule up the covering causing the latter to assume a convoluted shape and to enter the grooves.

The external diameter of that part of the tubular liner which enters the end of the hose is slightly greater than the hose's internal diameter to expand the hose and cause it to enter into the annular grooves in the nipple but it is preferred that the extreme leading end shall include a short portion having an external diameter not greater than the hose's internal diameter so that the walls of the hose are not reduced in thickness at that point.

Referring to the accompanying drawings: 75

Figure 1 is a longitudinal section of one form of end fitting in accordance with the invention;

Figure 2 shows the end fitting in process of assembly on the hose; 80

Figures 3 and 4 show two further constructions of end fittings.

Referring in the first case to Figures 1 and 2 which illustrate an end fitting designed for use with a hose having a surrounding metal braided tubular covering,

the end fitting includes a tubular nipple 1 having an axial boring enlarged at one end to receive the end of the hose 2, the hose when in position abutting against an internal shoulder 3. The nipple is formed with spaced annular grooves 4 into which the material comprising the hose is intended to flow as a result of the introduction of a liner 5, the liner being inserted in the boring in the nipple and forced axially in the direction of arrow A in Figure 2 into the interior of the hose until it assumes the position shown in Figure 1 in which an annular shoulder 6 on the liner engages a corresponding shoulder 7 on the nipple. The liner has a diameter slightly greater than the internal diameter of the hose, the material of the hose by virtue of its cold flow characteristics entering the annular grooves. The extremity 8 of the liner is shaped as at 9 to facilitate entry of the liner into the hose.

The extremity of the nipple is peened over the end of the liner as at 10 to secure the latter firmly in position as shown in Figure 1.

The hose carries an outer metal braided tubular covering 11 and this braided covering is secured to the end fitting by a ferrule 12 the latter being formed internally with a series of spaced annular grooves 13 for the entry of the braided covering as a result of the ferrule being forced up the covering in the direction of arrow B in Figure 2 into its operative position shown in Figure 1 in which an internal shoulder 14 on the ferrule abuts against an external shoulder 15 on the nipple. The ferrule is also formed with an inwardly directed bead 16, the braided covering being gripped between the end of the nipple and the bead.

To hold the ferrule in its operative position, the ferrule is formed with an annular protuberance 17, the ferrule being swaged at that point so that the metal is forced radially inwardly into an annular groove 18 in the nipple as shown in Figure 1.

To assist in holding the ferrule in position and also preventing rotation, the nipple may be formed with a straight knurling 19 which frictionally engages the inner surface of the ferrule when the latter is forced into its operative position.

The end fitting preferably carries a captive nut 20 having an inwardly directed shoulder 21 which engages a shoulder 22 on the nipple, the latter having a tapered face 23 which when the nut is tightened makes sealing engagement with a corresponding female part of the component to which the hose and its associated end fitting is to be attached.

Figure 3 shows a construction somewhat

similar to that illustrated in Figures 1 and 2, the main features of difference being as follows. The nipple 1 is formed with an annular groove 37, the end of the metal braided covering lying above the groove. The wall of the ferrule 12 is crimped as at 38 so that the braided covering will be forced inwardly around its complete periphery or at spaced points and gripped between the base of the groove and the crimpings.

The liner 5 fits into the end of the nipple and is formed with two spaced inclined faces 39 and 40 which engage corresponding faces on the nipple. To secure the liner firmly to the nipple the liner is formed with an annular well 41 in which is inserted an epoxy resin which when set secures the parts together.

Figure 4 illustrates a further alternative construction in which the liner and nipple are connected together by screw threads, an epoxy resin being smeared onto the threads before they are interengaged, the end of the hose being first inserted into the nipple, the liner then being inserted into hose and finally the parts screwed together. The ferrule is then forced up the metal braided hose covering and swaged at its end into an annular groove in the liner, the liner forming a part of the component with which the end fitting and hose are associated.

It will be appreciated that by using a cold flow material, the material when subjected to an outward radial pressure will flow freely into the annular grooves in the nipple to form a good seal.

#### WHAT WE CLAIM IS:—

1. An end fitting for a hose composed of a material having the property of cold flow, the hose being protected by a surrounding metal braided or plaited tubular covering, the end fitting including a tubular nipple formed with internally arranged annular grooves and adapted to receive the end of the hose, a tubular metal liner of a diameter slightly greater than the internal diameter of the hose insertable into the end of the hose to expand the hose and force the material of the hose radially outwardly into the annular grooves in the nipple to secure the hose firmly to the end fitting and a tubular ferrule surrounding that part of the nipple entered by the end of the hose and enclosing the end of the metal braided or plaited tubular hose covering, the latter being sandwiched and gripped between the nipple and ferrule, the ferrule being swaged into permanent engagement with an annular groove in the nipple or liner.

2. An end fitting as claimed in claim 1, wherein the ferrule is formed with annular grooves in its inner surface for the entry

of the braided covering as a result of the ferrule being forced up the covering into its operative position.

3. An end fitting as claimed in claim 1 or 2, wherein the ferrule is formed at its free end with an overhanging inwardly directed bead for the purpose specified.

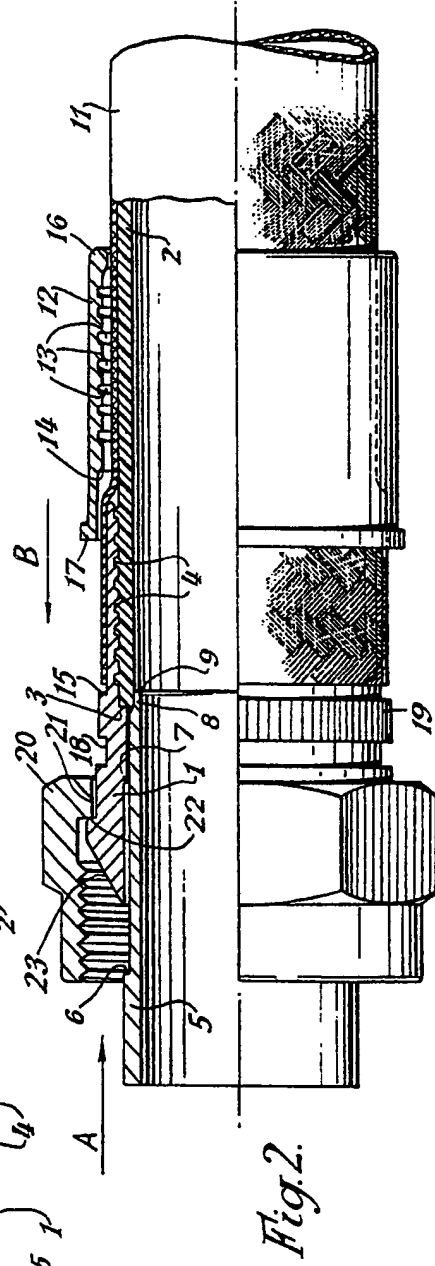
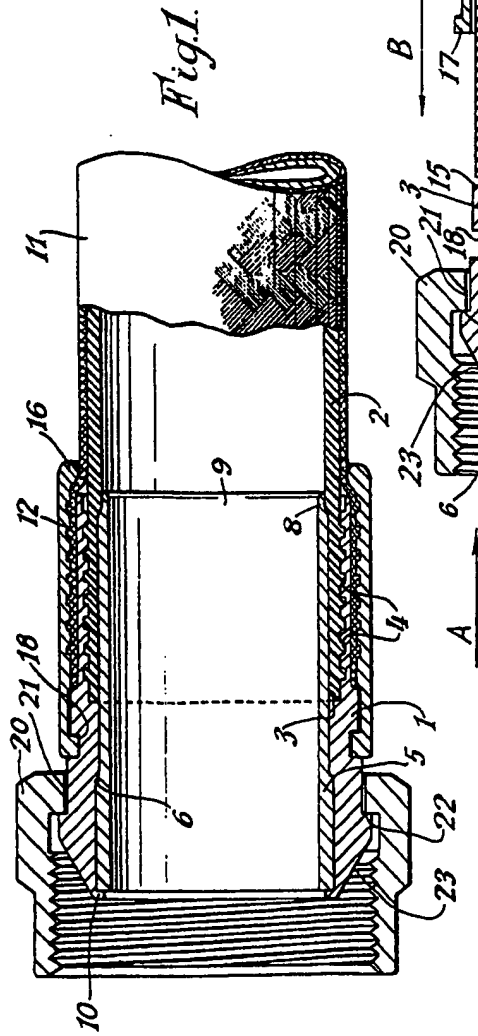
4. An end fitting as claimed in any of the preceding claims, wherein the ferrule is crimped at one or more points around its periphery above a recess in the nipple into which recess the metal covering is

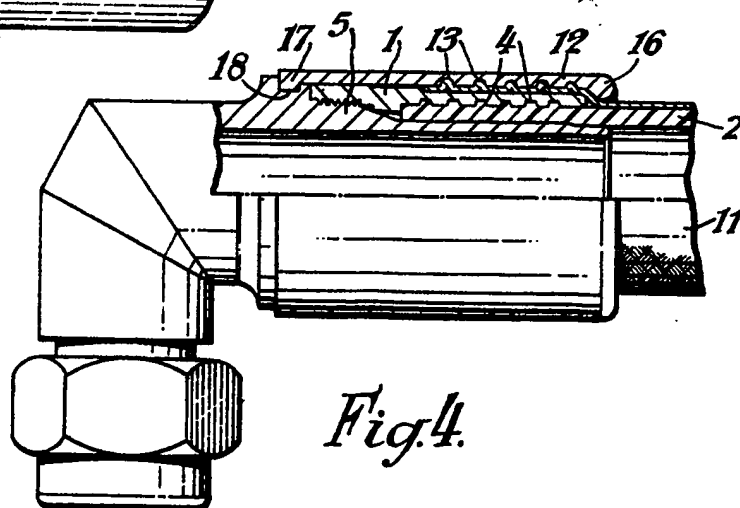
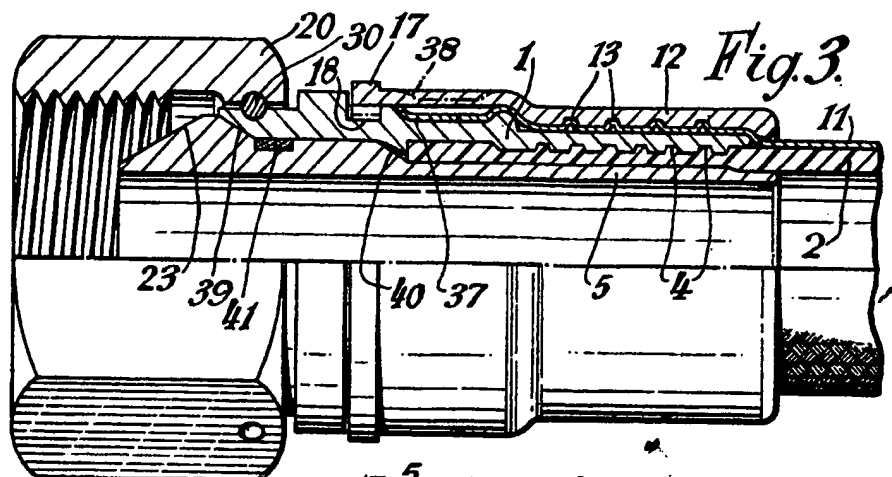
forced as a result of the crimping operation.

5. A hose end fitting substantially as described with reference to Figures 1 and 2 or Figure 3 or 4 of the accompanying drawings.

For the Applicants:—

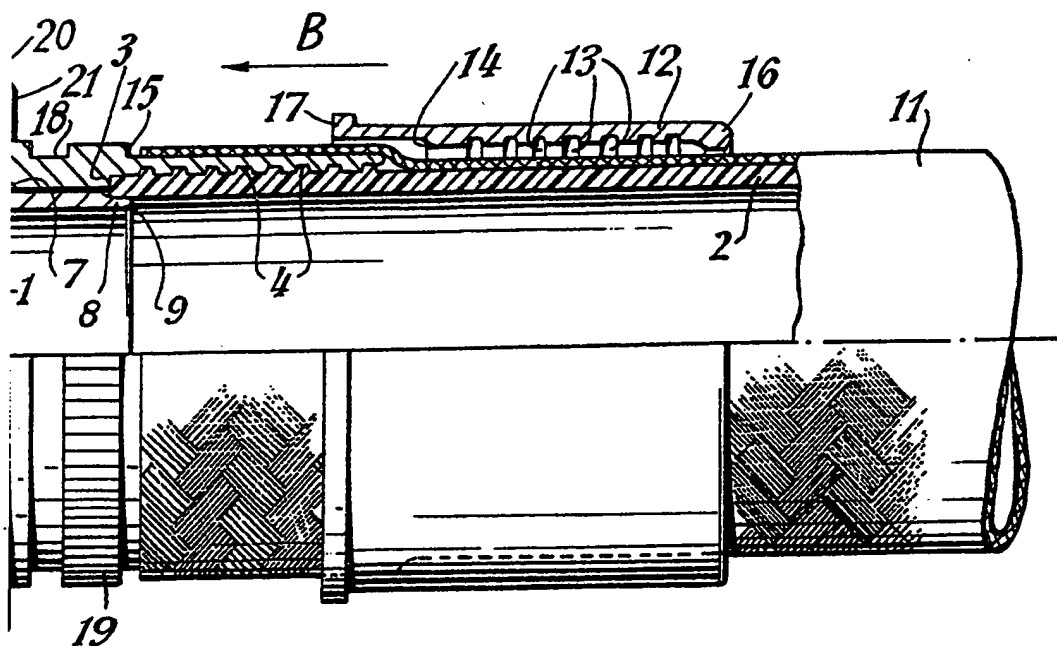
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*Fig. 1.*



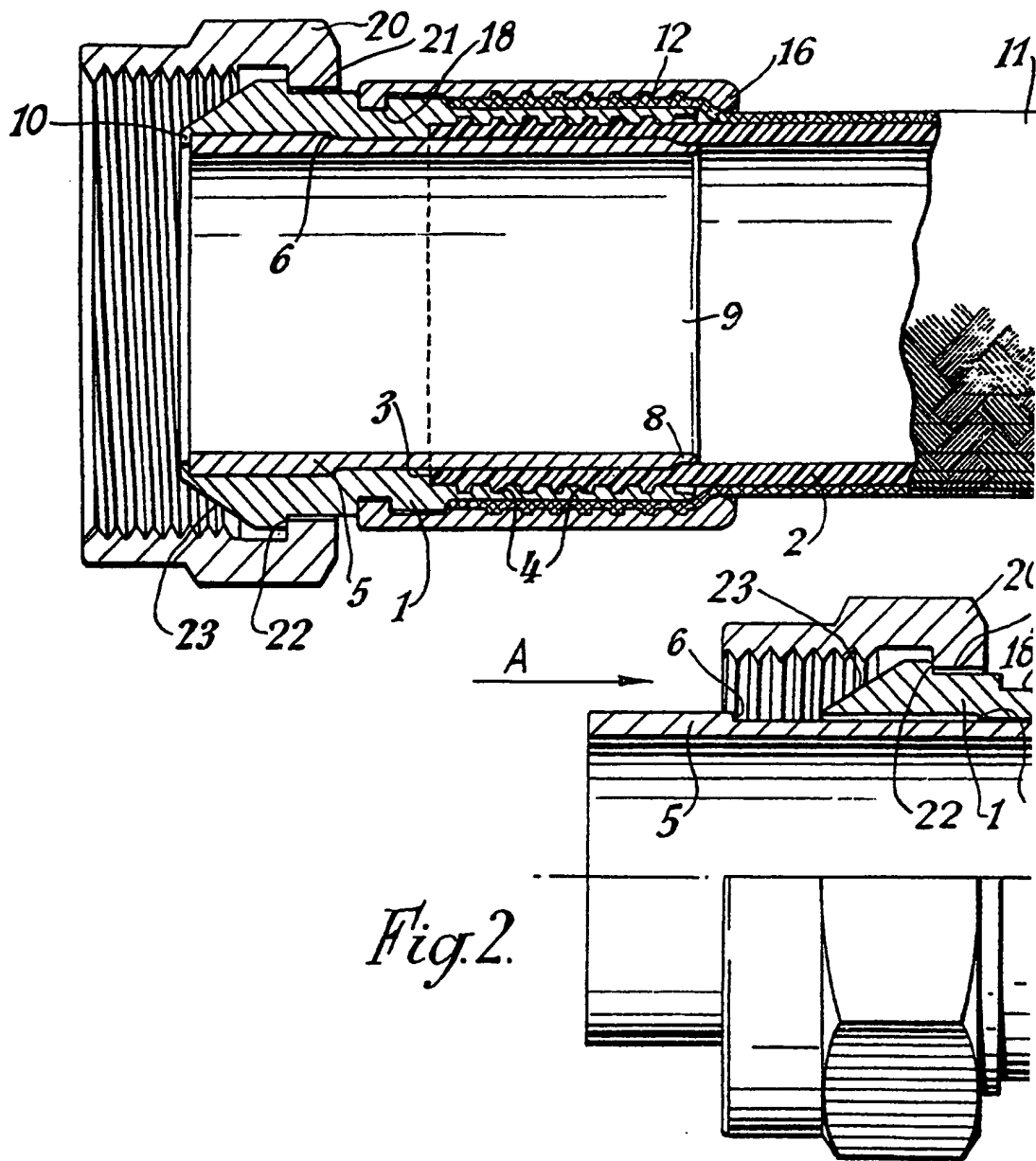


Fig. 2.